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PELORUS SOUND (INCLUDING FORSYTH BAY)

MAP 8 - SITES WITHIN BIOGEOGRAPHIC ZONE 3 (1 of 6)



MAP 9 - SITES WITHIN BIOGEOGRAPHIC ZONE 3 (2 of 6)



OVERVIEW

This area includes all of Pelorus Sound and Forsyth Bay inside a line drawn from Paparoa to Goat Point on Forsyth Island, and a second line drawn from Forsyth Island to the mainland across Allen Strait. The main channel of the Sound includes Kaituna Estuary at its head, Hikapu, Popoure and Waitata Reaches. Extending off the main channel are three large side arms: Kenepuru Sound; Beatrix Basin (Beatrix Bay, Clova Bay, Crail Bay); Tawhitinui Reach and Tennyson Inlet. The main channel generally broadens and deepens as it opens to the sea. Maximum depths increase from approximately 30m at the confluence of Hikapu Reach and Kenepuru Sound to between 63-87m at the mouth of the Sound. Maximum depths in Kenepuru Sound range from approximately 1m at Kenepuru Head to 31m near the mouth. Maximum depths in Beatrix Basin (approximately 27-36m) and Tawhitinui Reach-Tennyson Inlet (21-28m) are generally shallower than those in the main channel (50-60m off Tawero Point). This has the effect of separating circulation of the lower water column in these areas from circulation in the main channel. Strong tidal currents (up to 3 knots) result in scouring around headlands and in narrow passages. Coastal topography is steep and most of the shoreline is fringed by intertidal and subtidal rocky reefs composed of cobbles and small boulders. There are reefs of outcropping bedrock off points and on a number of pinnacles and shoals. A rocky reef extends to a depth of at least 40m off Tawero Point, but elsewhere reefs only extend to an average maximum depth of approximately 13m. Coarse, silty, shelly sand usually covers the lower slopes of the main channel and marginal bays below the reef. Soft mud covers most of the floor of the Sound and shallow, sheltered bays. The sand and mud meet at an average depth of 16m but the range varies from low water to more than 40m. There are extensive intertidal sand and mud flats in Kaituna Estuary; Mahikipawa Arm; Mahau Sound; Broughton Bay, Te Matau a Maui Bay, Goulter Bay, Waitaria Bay and Kenepuru Head in Kenepuru Sound; Nydia Bay; Clova Bay; Crail Bay and the head of Tennyson Inlet.



MAP 10 - SITES WITHIN BIOGEOGRAPHIC ZONE 3 (3 of 6)

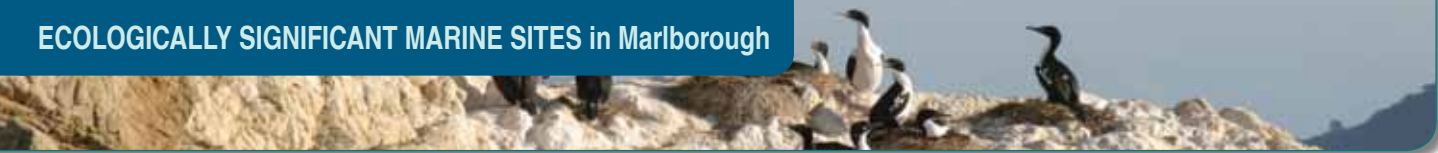


MAP 11 - SITES WITHIN BIOGEOGRAPHIC ZONE 3 (4 of 6)



MAP 12 - SITES WITHIN BIOGEOGRAPHIC ZONE 3 (5 of 6)





There is extensive aquaculture in Pelorus Sound, mainly longline mussel farms, and the small port at Havelock services the industry and commercial fishing. Treated sewage discharges into the Sound at Havelock and Portage. The Sound is a popular recreational area, with boats visiting from Nelson, Wellington and other regions.

Circulation in the Sound is complex due to freshwater inflow from the Pelorus and Kaituna Rivers, the complex channel system and the unusual tides in Cook Strait¹⁷⁸. The mean residence time of water in the main channel is approximately 21 days but is probably longer when river levels are low. Freshwater inflow into Pelorus Sound is much greater than Queen Charlotte Sound. The circulation in the main channel is essentially estuarine with a low-saline flow along the surface towards the sea, and denser saltwater coming into the Sound from Cook Strait along the bottom¹⁵³. During floods low-saline water moves rapidly down the Sound, reaching the middle of Waitata Reach in less than four days, and Cook Strait in eight days.

Rivers, especially during flood events, carry sediments, nitrogen and phosphorus into the Sound^{153,154,155,156}. Nitrate-nitrogen is also brought into the Sound from Cook Strait. Sediment release and excretion of ammonium-nitrogen by marine organisms are important sources of recycled nitrogen but without additional freshwater or marine inputs they are apparently insufficient to support high phytoplankton biomass. In general water flows in along the bottom of the bays and out along the surface. Bays next to the main channel appear to be rapidly flushed over the tidal cycle but deep bays in side arms take longer to refresh. In Hallam Cove (Tawhitinui Reach) and Crail Bay (Beatrix Basin) the lower water column is slow-moving and sometimes stagnant, and more of the upper water column leaves these bays on the outgoing tide than the lower. This allows ammonium, nitrogen and phosphorus to accumulate and a “chemocline” develops in the lower water column. Phytoplankton biomass in these bays is greatest at the depth of the chemocline.

Kenepuru Sound appears to have an important effect on conditions in Hikapu Reach. Under normal conditions saline water flowing inwards along the bottom is diverted into Kenepuru Sound by the channel at the entrance to Mahau Sound. During floods the flow-pattern in Kenepuru Sound changes

MAP 13 - SITES WITHIN BIOGEOGRAPHIC ZONE 3 (6 of 6)



as low salinity water is forced into it and held there until the flood has passed. During winter water cooled at the head of Kenepuru Sound sinks at the confluence with Hikapu Reach contributing nutrients to the subsurface water in the main channel. The residence time of water in Kenepuru Sound is approximately six days.

Strong currents in the area are caused by tides being out of phase on either side of the country. These semi-diurnal tidal progressive waves enter Cook Strait from the east and west and are reflected after passing through the Cook Strait narrows. This produces small tidal elevations, rapid changes in the phase of tidal elevations and strong currents in the narrows. Mean spring tidal range in Pelorus Sound is approximately 2.3m at the entrance and 2.6m at Havelock compared with 1.5m at Picton.

BIOTA

Because of their importance to aquaculture the plankton assemblages of Pelorus Sound have been well studied^{153,155,156,205}. Phytoplankton (plant plankton) peaks in the outer Sound between Tawero Point and Richmond Bay, and in the inner Sound at the confluence of Hikapu Reach and Kenepuru Sound²⁷⁴. Biomass production in the inner Sound is related to fresh water flooding into Kenepuru Sound and it remaining there long enough for a bloom to occur. Biomass in the outer Sound is related to phytoplankton flowing in from Cook Strait. This is also the way that blooms of toxic species such as *Alexandrium minutum* are rapidly transported into the Sound from coastal waters. Phytoplankton biomass is dominated by single-cell algae (diatoms), and changes from small chain-forming species in the spring to diverse larger forms in the autumn. Although small, microflagellates and ultraplankton are abundant, and dinoflagellates may contribute significantly to biomass at times. Conspicuous red-brown blooms of the non-toxic *Mesodinium rubrum* also occur in the Sound. Phytoplankton production in the Sound is balanced by losses due to tidal flushing, sedimentation and grazing by filter-feeders. Farmed mussels have the capacity to filter the entire water column within five days. Filter-feeders keep phytoplankton numbers low throughout most of the Sound, and in summer they rely on nutrients and phytoplankton flowing in from Cook Strait.

Zooplankton (animal plankton) is dominated by calanoid copepods but at times blooms of common jellyfish almost completely remove small zooplankton from the upper water column of the outer Sound. Small zooplankton, particularly copepods, supports large populations of anchovy and pilchards. Other relatively common bait fishes are sprats and jack mackerel. These bait fish and large zooplankton are fed on by schools of kahawai and barracouta, blue penguins fluttering shearwaters, gannets, spotted shag and white-fronted tern. Dillon Bell Point is an important roost for spotted shag, and the only breeding colony of gannet in Pelorus Sound is in Waimaru Bay. Larger predators such as juvenile thresher shark, bronze whaler, blue shark and kingfish are relatively common in the outer Sound during summer.

Despite the major differences in freshwater flow and circulation the rocky reef assemblages on the seafloor are generally similar to the inner Queen Charlotte Sound^{118,231}. Macroalgal biomass and diversity is generally low. There are virtually no laminarian kelps. Paddle weed is only found at a few sites around Paparoa and East Entry Point at the mouth of the Sound. Fucoids are the main large brown algae. Narrow flapjack has a similar distribution to paddle weed and its size and abundance declines rapidly with increasing distance into the Sound. It forms a sparse, patchy fringe at low water on headlands in as far as Tawhitinui Reach and Grant Bay in the Beatrix Basin. Beyond that, it is replaced by a mixed fringe of *Cystophora torulosa* and Neptune's necklace, or dense beds of blue, ribbed and green-lipped mussels. Dense subtidal stands of flexible flapjack grow down to 6-12m depth at headland sites along the main channel of the Sound from approximately Nikau Bay outwards. Plant size and abundance diminishes rapidly inside bays and side arms, and it is absent from Kenepuru Sound, Tennyson Inlet, the eastern side of Beatrix Bay and most of Crail Bay. In Beatrix Basin, Tawhitinui Reach and Tennyson Inlet flexible flapjack is generally replaced by slender zigzag weed as the dominant macroalga. It extends from low water to 6-11m depth in these areas. Mats of the sea grape are common on rocky and sandy substrates to approximately 24m depth in the outer Sound and side arms. Macroalgae become very sparse towards the head of Tennyson Inlet.

Encrusting coralline algae and invertebrates dominate most subtidal reefs. Common reef invertebrates include slaty sponge, small hydroids, the small colonial cup coral, common anemone, serpulid tubeworms (particularly *Galeolaria hystrix* and spirorbids), hermit crabs, starry limpet, green topshell, Cook's turban, turret shell, catseye, arc shell, nesting mussel, fan shell, window oyster, jewel star, cushion star, eleven-armed star, snake star, sea cucumber, kina, pink urchin and saddle seasquirt.

There are large colonies of tubeworms, predominantly *Galeolaria hystrix* with some *Pomatoceros terranova*, on reefs in the outer Sound (Tawero Point to East Entry Point, Beatrix Basin, Tawhitinui Reach), Kenepuru Sound and Forsyth Bay. The largest of these, up to 122cm high and 180cm long, are off Te Puraka Point in Beatrix Bay, and west of Weka Point in Kenepuru Sound. These colonies are vulnerable to anchor damage and trawling. Kina and most other large echinoderms except the eleven-armed star and sea cucumber are rare or absent inside a line from Dillon Bell Point to the entrance of Yncyca Bay¹⁸. Planktonic larvae of many echinoderms such as starfish, urchins and sea cucumbers are killed by exposure to low salinity water or high levels of suspended sediments. Reefs in more than 15m of water in the main channel support a relatively diverse fauna dominated by large sponges, particularly *Ancorina alata* but also finger sponges, several large hydroid species, compound ascidians and occasionally stony bryozoans (Lace coral, Separation Point coral).

Apart from spotty, common triplefin and variable triplefin there are few reef fishes, particularly in the inner Sound. Other relatively common species include short-tailed stingray, eagle ray, rock cod, sea perch, sweep, butterfly perch, yellow-eyed mullet, blue cod, triplefins (yellow-black triplefin, mottled triplefin, *Grahamina* spp., blue-eyed triplefin, spectacled triplefin) and leatherjacket. Tawero Point and West Entry Point were historically recognised "deep sea" fishing grounds where catches of snapper, blue cod, red cod, red gurnard and small sharks could be made from shore. Commercial blue cod fishing in Pelorus Sound ended by 1936. The present low number of reef fish is probably due to a combination of over fishing, habitat loss (particularly nursery and spawning habitats) and increased sedimentation due to land clearance.

Soft sediments support varied groups of species depending on the depth, composition and hydrology. Species assemblages in the main channel and large side arms have been extensively modified by trawling and dredging, and possibly accelerated sedimentation from catchment clearance and development. The invasive Pacific oyster is common in some estuarine habitats. Typical estuarine life on intertidal flats includes dense beds of cockles, pipi and, in particular sites, sea grass. Coarse sands below rocky reefs support beds of the bivalves (purple sunset shell, *Venerupis largillierti*) and large dog cockle as well as horse mussels, scallop, filter-feeding hermit crab, eleven-armed star, snake star, sea cucumber, pink urchin and the brachiopod *Terebratella haurakiensis* (attached to drift shell). Horse mussel shells are colonised by sponges, hydroids, compound ascidians and brachiopods (*Terebratella sanguinea*, *Waltonia inconspicua*). Rare species include the burrowing anemone. In several places along the main channel (Dillon Bell Point, Capsize Point, Tapii, Oke Rock) there appear to be remnant colonies of the Separation Point coral close to the base of the reef. Muddy habitats are dominated by the heart urchin, the brittlestars *Amphiura correcta* and *Ophiocoma novaezelandiae*, the holothurian *Pentadactyla longidentis*, the bivalves *Ennucula strangei* and *Nemocardium pulchellum*, the small tubeworm *Phyllochaetopterus socialis*, *Priapululus australis* and cirrolanid isopods (sea lice).

Other species found in the area include broadnose sevengill shark, spotted spiny dogfish, school shark, rough skate, short-tailed stingray, eagle ray, Elephant fish, red cod, red gurnard, scaly gurnard, john dory, ling, common warehou, snapper, tarakihi, yellow-eyed mullet, spotty, spotted stargazer, opal fish, witch, lemon sole, common sole, sand flounder and greenback flounder. Records of outer-shelf species such as scaly gurnard and ling reflect the Sound's connection with Cook Strait. Elephant fish spawn in Hallam Cove, Garne, Savill, Elaine and Penzance Bays, and off Camel Point. Garne Bay is the most significant spawning ground with large numbers of egg cases between 4-9m depth. Snapper are much more abundant in Pelorus Sound than Queen Charlotte Sound and spawn in Kenepuru where there was once a commercial seine fishery. A Ministry of Agriculture and Fisheries survey in 1987 indicated Mahau Sound, Maori, Nydia and Clova Bays are potentially the most important nursery



areas for snapper in the Pelorus Sound, with Te Mahia and Waitaria Bay being the most important in Kenepuru Sound. High catches of juvenile warehou were also recorded in outer Kenepuru Sound, Nikau, Maori, Four Fathom and Nydia Bays. In 1940 Beatrix Bay was identified as one of three spawning grounds for lemon sole in the Marlborough Sounds but it is not known if this is still the case. Up until the 1950s hapuku were often caught around Tawero Point and West Entry Point.

New Zealand king shag, a species endemic to the Marlborough Sounds, breed on Duffer's Reef on Forsyth Island. King shags regularly feed in the middle of the main channel and side arms in the outer Pelorus, particularly in Beatrix Bay. Their diet is dominated by sand-eel and flatfish.

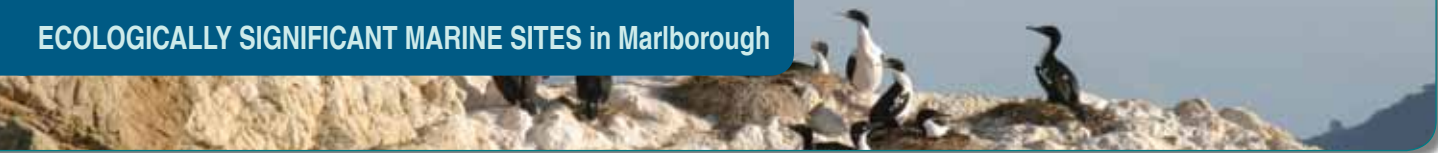
Havelock is the largest estuary in the Marlborough Sounds. *Spartina* has been removed by the Department of Conservation. Japanese kelp was introduced in the early 1990s and now occurs on most marine farms. Other exotic marine species recorded from this coastal area include: *Asperococcus bullosus*, *Cutleria multifida*, *Polysiphonia subtilissima*, *Elphidium vellai*, yellow boring sponge, *Polydora armata*, *Polydora hoplura*, *Theora lubrica*, *Corophium acutum*, red rock crab, *Bugula flabellata*, *Bugula neritina*, *Bugula stolonifera*, *Cryptosula pallasiana*, *Tricellaria porteri*, waxy seasquirt, *Botryllus schlosseri*, *Corella eumyota* and *Didemnum "candidum"*.

Table 4 - List of Sites of Significance in Biogeographic Zone 3

No.	Biogeographic Zone 3	Level of information	Representativeness	Rarity	Diversity & pattern	Distinctiveness	Size	Connectivity	Catchment
3.1	Harris Bay	2	H	L	M	M	M	L	L
3.2	Oke Rock	2	H	M	M	H	M	L	L
3.3	Duffers Reef	3	H	H	L	H	L	L	M
3.4	Bird Island	2	H	L	M	L	L	L	H
3.5	Maud Island	3	M	M	L	H	L	L	H
3.6	Tawhitinui reefs	2	M	L	M	M	M	L	L
3.7	Picnic Bay	2	H	M	M	H	L	L	L
3.8	Fitzroy Bay	3	H	M	L	M	L	M	H
3.9	Tennyson Inlet	2	H	L	L	L	H	H	H
3.10	Tuna Harvey & Duncan Estuaries	1	L	M	M	M	L	M	M
3.11	Tapapa, Kauauroa, Tawero Points	1	M	L	H	M	L	L	M
3.12	Piripaua Reef	2	M	L	M	M	M	L	L
3.13	Waimaru Peninsula	3	H	M	L	H	L	L	M
3.14	Clova Bay	2	M	M	L	M	M	H	L
3.15	Grant Bay	2	M	L	M	M	M	L	L
3.16	Crail Bay	2	M	L	L	M	L	L	M
3.17	Chance Bay	1	M	L	L	M	M	M	H
3.18	Little Nikau Bay	2	H	M	L	M	M	L	M
3.19	Kaiuma Estuary	2	H	M	M	M	M	L	L
3.20	Havelock-Mahakipawa Estuaries	3	H	M	H	H	H	M	L
3.21	Kenepuru Estuary	1	M	M	L	L	L	L	L

Key

1 = Brief visit	3 = Quantitative report	H = High	M = Medium	L = Low
2 = Qualitative report	4 = Personal communication			



3.1 HARRIS BAY (Subtidal)

Harris Bay is on the western side of the entrance to Pelorus Sound, immediately south of Paparoa and 54 km by sea from Havelock. Harris Bay has 1.7 km of coastline and a sea area of 37.5 ha. The northern side is relatively shallow and supports a 20 ha bed of red algae located in 8-22m depth⁹⁰.

Assessment of ecological significance

This is the largest known dense bed of foliose red algae in the Pelorus biogeographic area.

3.2 OKE ROCK (Subtidal)

Oke Rock is located 0.7 km east of Mataka Point on the western side of the Pelorus Sound entrance. A small part of this pinnacle breaks the surface at low water and is easily located by the beacon. Subtidally the rock is steep sided and continuous with sand/shell banks that extend west. Other rock outcrops occur west of Oke Rock but do not break the surface.

Assessment of ecological significance

Oke Rock is notable for having the highest known abundance of the burrowing anemone in the Marlborough Sounds¹⁰¹. This anemone lives on sand/broken shell banks at 12-28m depth. Oke Rock is also colonised by a good diversity of encrusting species including green-lipped mussels, sponges, bryozoans, hydroids and ascidians. Strong tidal currents bring plenty of food to these filter-feeders. Oke Rock is the only site in the Pelorus biogeographic area where the Marlborough Sounds endemic chiton *Notolax latalamina* has been recorded.

3.3 DUFFERS REEF (Terrestrial)

Duffers Reef is a chain of small islets and stacks (approximately 10 in total) located at the north-west corner of Forsyth Island. The stacks are all less than one hectare in size and together extend approximately 1.2 km. In 1951 king shags were discovered nesting on the reef²⁸². Presently the most western rock stack in the chain is a nesting area for king shags. Up until 1964 the birds used the 2nd and 3rd most western rocks³³⁹.

Assessment of ecological significance

Of the four main king shag breeding sites in the Marlborough Sounds, Duffers Reef has been the most important. In 1992, 42% of all the nests were on Duffers Reef. Duffers Reef and the Trios contain more than 60% of all the birds^{339,340}. King shags breed at few locations in the study area. All sites where they roost and breed are therefore considered important.

3.4 BIRD ISLAND (Terrestrial)



Bird Island
(MDC)



Bird Island consists of four small islets in the middle of Forsyth Bay, 2.5 km west of Allen Strait. Bird Island is a small narrow chain of rocky stacks separated by low-lying rock or shingle reefs which are often covered by the tide. The total area is approximately 0.86 ha.

Assessment of ecological significance

Despite being small, the islets are important to wildlife. Reef heron use the island for feeding and probably breeding, while variable oystercatcher regularly breeds here. Where burrowing is possible, fluttering shearwater and blue penguin nest on the stacks. Spotted shag, white-fronted tern, red-billed gull and black-backed gull also nest here. Bird Island represents the best example of a multi-species bird nesting, roosting and feeding area in the Pelorus biogeographic area.

3.5 MAUD ISLAND (Terrestrial)

Maud Island is located at the confluence of Tawhitinui and Waitata Reaches. It has a circumference of approximately 13.5 km and land area of 311 ha. Maud Island is 40 km by sea from Havelock and 16 km south-west of the Pelorus Sound limit. Fluttering shearwater chicks were transferred to burrows on the island during the 1990s and a colony is slowly establishing as these birds return to breed³⁰.

Assessment of ecological significance

This newly established breeding colony for fluttering shearwater is one of only two in the Pelorus biogeographic area, the other being Bird Island. It is the only site in Marlborough where a colony of fluttering shearwater has been established by human intervention.

3.6 TAWHITINUI REACH REEFS (Subtidal)

A number of rocky reefs are located in Tawhitinui Reach. Brightlands Bay eastern reef is located between Brightlands Bay and Rams Head along the southern shoreline of Tawhitinui Reach. It is approximately 130m long⁸². Picnic Bay eastern reef is approximately 600m offshore from Picnic Bay. Dart Rock is an offshore reef located 1.2 km east of Tawhitinui Island¹¹⁸.

Assessment of ecological significance

These are the best examples of rocky reefs in the sheltered waters of Tawhitinui Reach. Offshore reefs or those that extend out from shore are not common in Pelorus Sound. Most rocky coast is a narrow strip right next to the intertidal zone.



Rhodoliths,
Picnic Bay
(Rob Davidson)

3.7 PICNIC BAY (Subtidal)

Picnic Bay is a small bay on the northern shore of Tawhitinui Reach, 2 km east of Sheep Point. It has 670m of coastline and a sea area of 5.5 ha.

Assessment of ecological significance

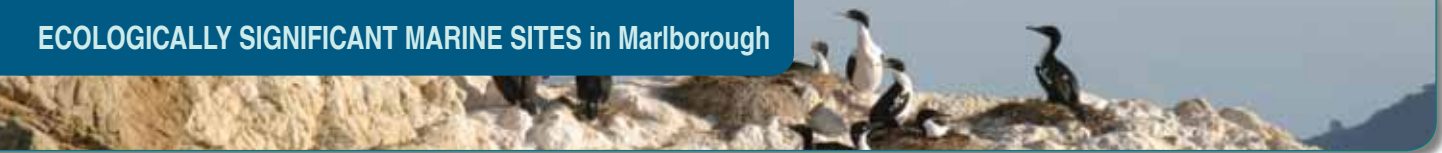
This is one of three known rhodolith beds in Marlborough; the other beds are around D’Urville Island. Picnic Bay rhodoliths form a dense cover over 1.9 ha of seafloor. These calcified seaweeds have a critical ecological role in attracting and providing habitat for benthic invertebrates and fishes^{17,26,133,174,160,283,353,355}.

3.8 FITZROY BAY (Subtidal)

Fitzroy Bay, including Hallum Cove, Garne, Savill and Canoe Bays, is situated at the western end of Tawhitinui Reach. The Garne and Savill Bay Scenic Reserves cover much of the catchment of these bays.

Assessment of ecological significance

The shallow edges of these bays are spawning grounds for elephant fish^{101,118}. This is one of two spawning areas in the Marlborough Sounds, the other is in inner Queen Charlotte Sound.



3.9 TENNYSON INLET (Intertidal and Subtidal)

Tennyson Inlet is located at the western end of Tawhitinui Reach, 22 km north of Havelock. It has a main reach with many small bays including Tawa, Tuna, Deep and Godsiff. The Inlet is largely separated from the rest of the Sound and water is slow to refresh¹⁵⁶. There is a relatively low variety of subtidal habitats and species compared to other areas in the Marlborough Sounds^{101,118}.

Assessment of ecological significance

Tennyson Inlet is the largest marine area in Marlborough almost completely surrounded by a catchment of protected native forest (Tennyson Inlet Scenic Reserve) thereby ensuring low sediment input. Despite the lack of diversity and low abundance of subtidal organisms, the protected catchment makes this marine area the best example of its kind in Marlborough.

3.10 TUNA, HARVEY & DUNCAN BAY ESTUARIES (Intertidal)

Tuna, Harvey and Duncan Bays are located in Tennyson Inlet and all have small estuaries of between 10 and 15 ha.



Tuna Bay Estuary
(MDC)

Assessment of ecological significance

Banded rail have been reported in these bays, but may not be here permanently due to limited wetland habitat¹²⁵. Although small, these estuaries support habitats that are not common in Marlborough. They may also provide important stepping stones for estuarine birds travelling between Tasman Bay, Pelorus and Blenheim. There have been no formal biological surveys of these estuaries.

3.11 TAPAPA POINT, KAUAUROA BAY AND TAWERO POINT (Subtidal)

These three stretches of coast are located east of Maud Island at the eastern confluence of Waitata and Tawhitinui Reaches and the main Pelorus Channel. The Tapapa Point coast is approximately 1.4 km long, with Kauauroa Bay site approximately 1.8 km in length, and the Tawero Point current community is approximately 1.2 km in length. The subtidal sea floor shelves steeply and is swept by strong tidal currents.

Assessment of ecological significance

There is a wide variety of filter feeding organisms including biogenic habitat formers such as bryozoans, sponges, ascidians, horse mussels and hydroids present at this site⁹⁰. Fish, particularly blue cod, are common and these communities also provide habitat for juvenile blue cod. These are some of the best examples of tidally swept habitats within the Pelorus biogeographic area.

3.12 PIRIPAUA REEF (Subtidal)

Piripaua Neck is a narrow section of land separating Forsyth Bay to the north and Beatrix Bay to the south. Beatrix Bay, approximately 40km by sea from Havelock, is between Popoure and Waitata Reaches. A large inshore reef extends offshore from the small headland.

Assessment of ecological significance

This is one of the better examples of a reef system in the central sheltered Pelorus Sound. Reefs that extend perpendicular to the shore are relatively uncommon in Pelorus Sound.

3.13 WAIMARU PENINSULA (Terrestrial)



Gannet colony,
Waimaru Peninsula
(Rob Davidson)

Waimaru Peninsula is located at the northern entrance to Clova Bay, eastern Tawhitinui Reach. Approximately 100 pairs of gannets nest here and numbers appear to be increasing steadily with some now nesting on the mainland nearby⁴². Gannet breeding started here in 1976. Spotted shags also nest and roost on Waimaru Peninsula.

Assessment of ecological significance

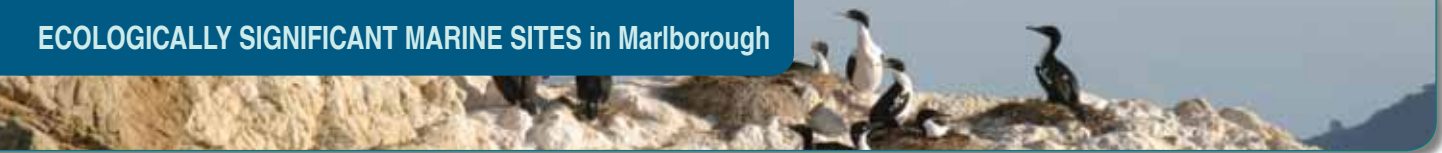
The rock off the tip of Waimaru Peninsula is one of two gannet colonies in Marlborough and one of only approximately 15 breeding colonies in New Zealand. These birds take advantage of the abundance of small fish species (anchovy, pilchard, and sprat) in the Tawhitinui Reach, Tennyson, Hallam, Beatrix and Crail Bay areas.

3.14 CLOVA BAY (Intertidal and Subtidal)

Clova Bay is situated between Beatrix and Crail Bays, 39 km by sea from Havelock. It has 7.8 km of coastline and an area of 335 ha. The mouth of Clova Bay is approximately 1.7 km wide. At the head is a tidal estuary with sand flats, salt marsh and sea grass beds. Some fringing terrestrial plants border the tidal flats particularly in the eastern edges of the tidal flats around Totaranui Stream. There are horse mussels and scallops in the shallow subtidal area off Totaranui Stream.

Assessment of ecological significance

The estuarine fringe and the intact subtidal habitats immediately offshore are a relatively uncommon combination in Marlborough and this is one of the best examples.



3.15 GRANT BAY (Subtidal)

Grant Bay is a small bay just east of Crail Bay approximately 39 km by sea from Havelock. A large reef approximately 200 m in length extends from the small headland in this bay.

Assessment of ecological significance

Blue maomao was recorded on this reef in 2000⁸². This fish is near its southern New Zealand limit in the Marlborough Sounds and is therefore of scientific interest. This is one of the largest reef systems inside the sheltered waters of Pelorus Sound and is a good example of local reef structure.

3.16 CRAIL BAY (Subtidal)

The coastline of Crail Bay measures 26km from Opani-aputa Point to the western headland of Grant Bay, but not including Ouokaha Island. It is approximately 2.9 km wide at the entrance and has an area of 1570 ha. A dense area of horse mussels growing on a stable soft bottom occurs in an unnamed bay between Ellie Bay and Wet Inlet.

Assessment of ecological significance

Dense horse mussel beds are relatively uncommon in Pelorus Sound.

3.17 CHANCE BAY (Intertidal and Subtidal)

Chance Bay is located on the northern shore of outer Nydia Bay. It is 24 km by sea from Havelock.

Assessment of ecological significance

This bay is biologically significant because it is surrounded by protected native forest areas in the Chance, Penguin and Fairy Bays Scenic Reserves. Protected native forest catchments adjacent to the sea are not common in Marlborough and Chance Bay is one of the better examples in Marlborough. The intertidal and subtidal community has not been surveyed.

3.18 LITTLE NIKAU BAY (Subtidal)

Little Nikau Bay is located on the eastern side of Hikapu Reach and south of Nikau Bay. It has 2.4km of coastline, a sea area of 83.5 ha, and is 16.5 km by sea from Havelock. This site is notable as it supports the sea pen *Virgularia gracillima*, a tiny species that lives in fine sediments in sheltered waters⁸¹.

Assessment of ecological significance

This species of sea pen is widespread from Milford Sound to the Marlborough Sounds and appears to tolerate waters with high sediment inputs. Little Nikau is the only known site in Marlborough where it has been recorded in high densities.

3.19 KAIUMA ESTUARY (Intertidal)

Kaiuma Bay is a shallow bay in the inner part of Pelorus Sound, 8.5 km by sea from Havelock. There are approximately 12 ha of salt marsh habitat at the head of Kaiuma Bay, dominated by the sea rushes *Juncus krussii* var. *australiensis* and *Apodasma similis*⁷⁷. Other prominent species are herb-field species (Sea primrose, *Selliera radicans*, batchelor's button, glasswort, slender club rush, *Apium prostratum* and introduced *Plantago coronopus*), sea grass (*Zostera* sp.), and shrubs (marsh ribbonwood and *Muehlenbeckia complexa*). The estuarine area is dominated by pebbles, cobbles and small areas of mud. There is 1.6 ha of coastal tidal wetland forest and 3.8 ha of coastal forest⁷⁷.

Assessment of ecological significance

The head of Kaiuma Bay is one of Marlborough's best remaining examples of the sequence from estuarine habitat through to coastal forest. The estuary also supports a population of banded rail⁷⁷.





Kaiuma Bay Estuary
(MDC)

3.20 HAVELOCK-MAHAKIPAWA ESTUARIES (Intertidal and Subtidal)

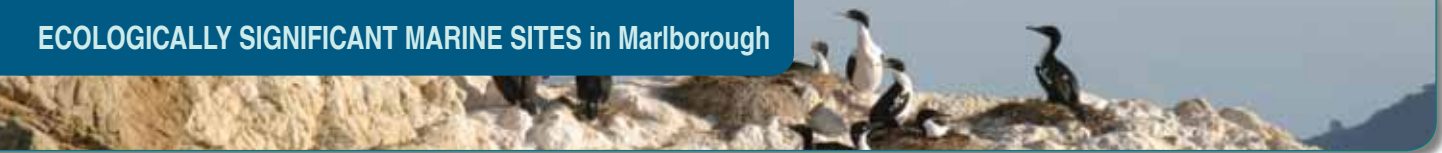


Pelorus Estuary
(MDC)

This area is located at the inner-most part of Pelorus Sound. The Havelock Estuary is fed by the Pelorus and Kaituna Rivers and many smaller streams. This site also includes the separate and smaller estuarine area at the head of Mahakipawa. Since 2005 approximately 60 ha of the introduced *Spartina* have been eradicated by spraying.

Assessment of ecological significance

This estuary system is the largest estuary in the Marlborough Sounds⁹⁹. At low tide, the Pelorus and Kaituna deltas link to form 163 ha of salt marsh and adjacent tidal flats. The estuary has a low diversity of invertebrates, probably because of high fresh water flows. A study in 2000 recorded six species of native freshwater fish in nearby streams including short-jawed kokopu and 36 wetland birds including several threatened species, such as banded rail, marsh crake, black-fronted tern, white-fronted tern, banded dotterel and caspian tern⁹⁹. Black stilt visit this estuary on rare occasions. There is a large population of the sea sedge *Carex litorosa* in the Pelorus River delta system and a smaller one in the Kaituna River mouth.



3.21 KENEPURU ESTUARY (Intertidal)

Kenepuru Estuary is located at the eastern end of Kenepuru Sound, 22 km from the main Pelorus Sound channel.

Assessment of ecological significance

The tidal area is used by a variety of wetland birds, occasionally including the banded rail¹²⁵. This estuarine area has not been formally surveyed but estuarine habitats are not common in Marlborough and may be important as stepping stones for migrating birds.

4

QUEEN CHARLOTTE SOUND

MAP 14 - SITES WITHIN BIOGEOGRAPHIC ZONE 4 (1 of 2)



OVERVIEW

This coastal area covers Queen Charlotte Sound, eastern Marlborough Sounds, inside a line bisecting Long Island drawn from Te Ahitaore, Ship Cove to Cooper Point, Arapawa Island; and a second line drawn from Dieffenbach Point to Kaitapeha Bay, Arapawa Island. Queen Charlotte Sound's shoreline includes two large inlets (Endeavour Inlet and East Bay, Arapawa Island), approximately 20 large bays and numerous smaller coves. Maximum depths through most of the area range from approximately 30-45m. Depth reaches 75m off Dieffenbach Point at the entrance to Tory Channel, and there is a large depression 50-80m deep along the western side of Blumine Island. There are also holes up to 58m deep either side of Patten Passage. Unlike Tory Channel, maximum depths in the marginal bays and inlets are similar to those in the main body of the Sound.

The surrounding land is steep and most of the shoreline is fringed by cobbles and boulders. There are bedrock outcrops off points and on some pinnacles and shoals. Rocky shores extend to a maximum depth of 33m and average 12.4m maximum depth. Coarse, silty, shelly sand usually covers the lower

